CHARGED-PARTICLE-BEAM MAPPING PROJECTION-OPTICAL SYSTEMS AND METHODS FOR ADJUSTING SAME

Abstract of the Disclosure

Charged-particle-beam (CPB) mapping projection-optical systems and adjustment methods for such systems are disclosed that can be performed quickly and accurately. In a typical system, an irradiation beam is emitted from a source, passes through an irradiation-optical system, and enters a Wien filter ("E×B"). Upon passing through the E×B, the irradiation beam passes through an objective-optical system and is incident on an object surface. Such impingement generates an observation beam that returns through the objective-optical system and the E×B in a different direction to a detector *via* an imaging-optical system. An adjustment-beam source emits an adjustment beam used for adjusting and aligning the position of, *e.g.*, the object surface and/or the Wien's condition of the E×B. The adjustment beam can be off-axis relative to the objective-optical system. For such adjusting and aligning, fiducial marks (situated, *e.g.*, in the plane of the object surface) can be used that are optimized for the CPB-optical system and the off-axis optical system. Desirably, the image formed on the detector when electrical voltage and current are not applied to the E×B is in the same position as the image formed on the detector when electrical voltage and current are applied to the E×B. Also provided are "evaluation charts" for use in such alignments that do not require adjustment of the optical axis of the irradiation-optical system, and from which the kinetic-energy distribution of the emitted adjustment beam is stable.